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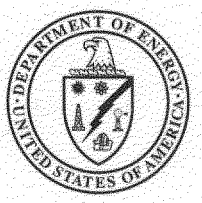

U.S. Department of Energy
Idaho Operations Office

ICDF Complex Operational and Monitoring Sampling and Analysis Plan

Idaho National Engineering and Environmental Laboratory

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Prepared for the
U.S. Department of Energy
Idaho Operations Office

ABSTRACT

The *ICDF Complex Operational and Monitoring Sampling and Analysis Plan* provides information about the project description, project organization, and quality assurance and quality control procedures that will be used to sample the INEEL CERCLA Disposal Facility landfill leachate, evaporation pond liquid and sediment, and pump station liquid during routine operational monitoring activities. This document is used to specify the procedures for obtaining the data of known quality required by the operations activities for the INEEL CERCLA Disposal Facility Complex.

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ACRONYMS

ALR	action leakage rate
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
COC	chain of custody
DOE-ID	Department of Energy Idaho Operations Office
DQO	data quality objective
DQA	data quality assessment
EPA	Environmental Protection Agency
HWMA	Hazardous Waste Management Act
ICDF	INEEL CERCLA Disposal Facility
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
LCRS	leachate collection recovery system
LDR	land disposal restriction
LDRS	leak detection and recovery system
NESHAP	National Emissions Standards for Hazardous Air Pollutants
O&M	operation and maintenance
OU	operable unit
PCB	polychlorinated biphenyl
PLDRS	primary leak detection and recovery system
QA	quality assurance
QAPjP	Quality Assurance Project Plan
QA/QC	quality assurance/quality control
QC	quality control
RCRA	Resource Conservation and Recovery Act

ROD	Record of Decision
SAM	Sample and Analysis Management
SAP	Sampling and Analysis Plan
SLDRS	secondary leak detection and recovery system
SLERA	screening level ecological risk assessment
SOP	standard operating procedure
SSA	Staging and Storage Annex
SSSTF	Staging, Storage, Sizing, and Treatment Facility
TSCA	Toxic Substances Control Act
VOC	volatile organic compound
WAC	Waste Acceptance Criteria
WAG	waste area group
USC	United States Code

ICDF Complex Operational and Monitoring Sampling and Analysis Plan

1. INTRODUCTION

The Department of Energy Idaho Operations Office (DOE-ID) authorized a remedial design/remedial action for the Idaho Nuclear Technology and Engineering Center (INTEC) in accordance with the Waste Area Group (WAG) 3, *Operable Unit* (OU) *3-13 Record of Decision* (ROD) (DOE-ID 1999). The OU 3-13 ROD requires the removal and on-Site disposal of some of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) remediation wastes generated within the boundaries of the Idaho National Engineering and Environmental Laboratory (INEEL).

The INEEL CERCLA Disposal Facility (ICDF) Complex is an on-Site, engineered facility, located south of INTEC and adjacent to the existing percolation pond (Figure 1). Designed and authorized to accept not only WAG 3 wastes, but also wastes from other INEEL CERCLA actions, the ICDF Complex will include the necessary subsystems and support facilities to provide a complete waste management system.

The major components of the ICDF Complex include

- The disposal cells (landfill)
- An evaporation pond, consisting of two cells
- The Staging, Storage, Sizing, and Treatment Facility (SSSTF).

The ICDF Complex, including a buffer zone, covers approximately 40 acres and has a landfill disposal capacity of approximately 510,000 yd^3. The ICDF landfill meets the substantive requirements of Resource Conservation and Recovery Act (RCRA) Subtitle C (42 U.S. Code [USC] 6921 et seq.), the Idaho Hazardous Waste Management Act (HWMA 1983), DOE Order 435.1, and Toxic Substances Control Act (TSCA) polychlorinated biphenyl (PCB) landfill design and construction requirements (15 USC 2601 et seq.). The landfill is the consolidation point for CERCLA-generated wastes within the INEEL boundaries. The landfill will be able to receive CERCLA-generated wastes outside WAG 3 that meet the land disposal restriction (LDR) requirements (DOE-ID 2003a). Waste generated within WAG 3 that has not triggered placement is not required to meet LDR criteria.

The evaporation pond, designated as a RCRA Corrective Action Management Unit in the OU 3-13 ROD, will be the disposal site for ICDF leachate and other aqueous wastes generated as a result of operating the ICDF Complex. In addition, other aqueous wastes generated by WAG 3, such as existing Group 4 and Group 5 purge water, may be disposed of in the evaporation pond in accordance with the ICDF evaporation pond Waste Acceptance Criteria (WAC) (DOE-ID 2002a).

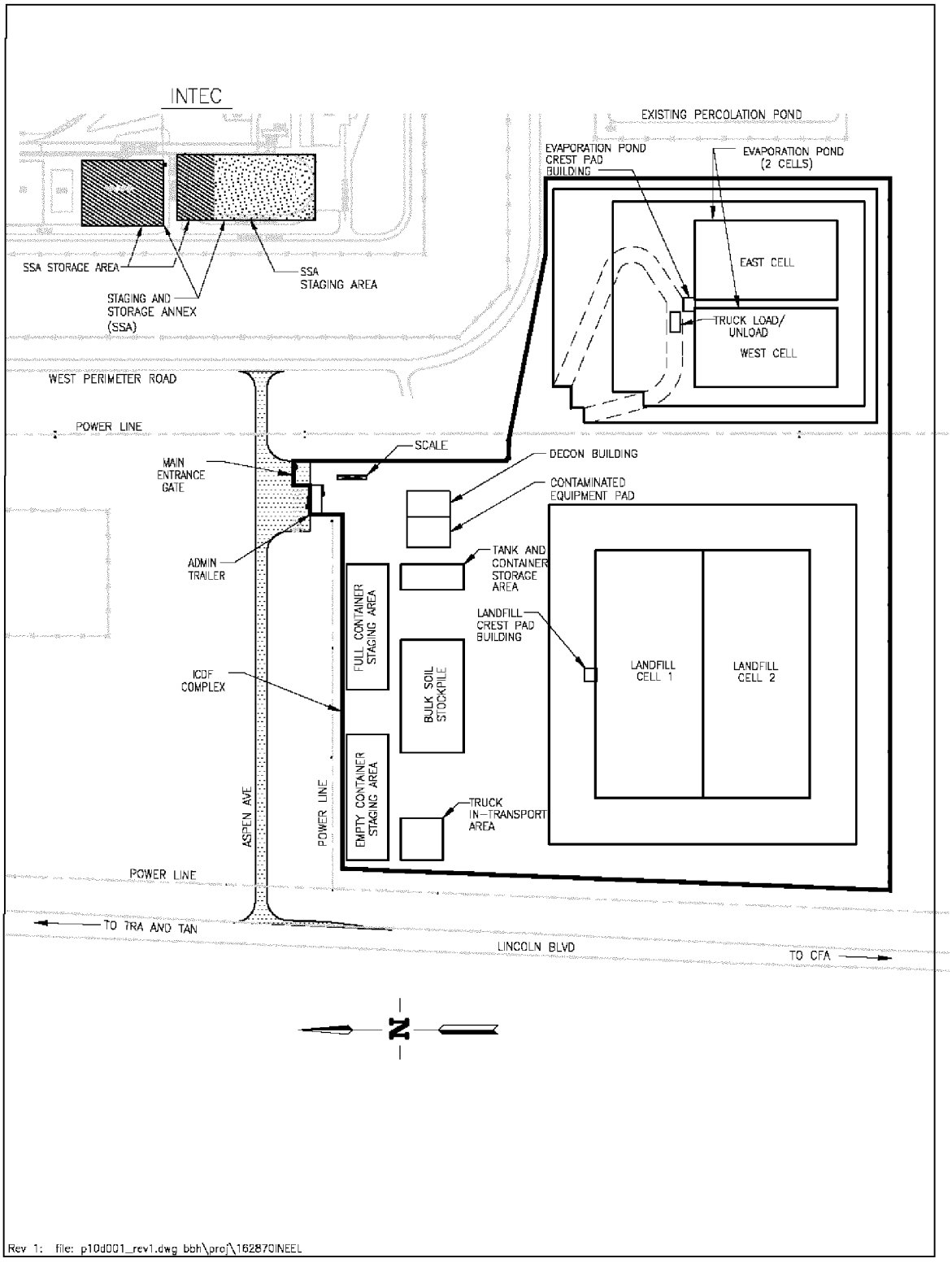

Figure 1. ICDF Complex site design.

The Staging and Storage Annex (SSA), located within the INTEC fenced area, serves as a temporary staging and storage area for INEEL CERCLA waste. The waste in the SSA will be designated for

- Direct disposal to the ICDF landfill
- Direct disposal in the evaporation pond
- Staging, storage, or treatment.

Wastes from WAG 3 and other CERCLA actions within the INEEL boundaries will be stored at the SSA during the design and construction of the ICDF Complex. The SSSTF will accept low-level, mixed low-level, hazardous, and TSCA remediation wastes. Most of the waste will be contaminated soil, but debris and CERCLA investigation-derived waste are also included in the waste inventory.

1.1 Purpose of the Sampling and Analysis Plan

The *ICDF Complex Operational and Monitoring Sampling and Analysis Plan* (SAP) addresses the collection of environmental data from the evaporation pond, leachate collection system, leak detection systems, and pump station for operational monitoring purposes. Analyzing these data will determine whether the concentration of specific constituents present in the water and sediment meet the concentration-based evaporation pond WAC for these constituents (DOE-ID 2002a). The evaporation pond WAC provides the basis for the concentrations of radioactive and nonradioactive constituents that may be present in the aqueous wastes in the evaporation pond. Compliance with the evaporation pond WAC will ensure protection of human health and the environment. The environmental data collected from the evaporation pond will also be used to determine worker safety issues for operations and maintenance. Finally, the evaporation pond water and sediments will be sampled and analyzed annually to support the National Emissions Standards for Hazardous Air Pollutants (NESHAP) compliance calculations (EDF-2236) and screening level ecological risk assessment (SLERA) monitoring requirements (EDF-ER-311) for the ICDF Complex. This SAP addresses landfill leachate sampling that will be performed for the leachate collection recovery system (LCRS) over and above that identified in the Groundwater Monitoring Plan (DOE-ID 2002b). If any discrepancy is identified between this SAP and the Groundwater Monitoring Plan for the sampling of the LCRS, this SAP takes precedence. For sampling of the LCRS, this SAP replaces all sampling described in the Groundwater Monitoring Plan.

The LCRS will be sampled twice each year for the same baseline constituents that will be sampled in the Snake River Plain Aquifer (SRPA) and will be sampled monthly for key indicator parameters. These data will be used as quality assurance (QA) that the total contaminant mass disposed to the landfill produces leachate that poses an acceptable risk to the SRPA. These data will be used to assess and predict the performance of the landfill and may be used to determine worker safety issues for operations and maintenance. These data will be used to track waste inventory transfers to the evaporation pond and to establish the waste profile in accordance with evaporation pond WAC (DOE-ID 2002a). In addition, these data will be used to identify signature constituents in the leachate and guide future monitoring and sampling of the primary leak detection and recovery system (PLDRS) and the secondary leak detection and recovery system (SLDRS), if necessary. The PLDRS and SLDRS will also be sampled on annually for certain field parameters, if liquid is present. Increased frequency or chemical sampling of the PLDRS or SLDRS would only occur if the action leakage rate (ALR) is exceeded. The ALR measurements and response plan for the landfill and evaporation pond are discussed in Section 4 of the O&M Plan (DOE-ID 2003b).

This SAP also describes the sampling of the pump station liquid to assess the contribution of the sump to the overall evaporation pond concentrations. The pump station is near the Decon Building.

This report complies with the *Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10, and Inactive Sites* (DOE-ID 2002c). This Quality Assurance Project Plan (QAPjP) presents the functional, organization, and quality assurance/quality control (QA/QC) protocols to achieve the required data quality objectives (DQOs). This QAPjP pertains to all environmental, geotechnical, geophysical, and radiological sampling, testing, measurement, and data review activities for the Environmental Restoration Program. Section 3 of this SAP presents the DQOs developed to guide routine monitoring and sampling for the ICDF Complex.

2. PROJECT ORGANIZATION AND RESPONSIBILITIES

Section 2 of the *ICDF Complex Operations and Maintenance Plan* discusses the ICDF Complex project organization and responsibilities (DOE-ID 2003b).

3. DATA QUALITY OBJECTIVES AND CRITERIA FOR ROUTINE CHEMICAL ANALYSES

The DQO process is a systematic planning tool developed by the Environmental Protection Agency (EPA) for establishing criteria for data quality and data collection designs (EPA 2000). The DQO process consists of seven iterative steps that yield a set of principal study questions and decision statements. The seven steps comprising the DQO process are

- Step 1: State the problem
- Step 2: Identify the decision
- Step 3: Identify the inputs to the decision
- Step 4: Define the study boundaries
- Step 5: Develop decision rules
- Step 6: Specify limits on the decision
- Step 7: Optimize the design for obtaining data.

Samples will be taken and analyzed from the LCRS, PLDRS, SLDRS, evaporation pond cells, and the pump station. Leachate samples from the LCRS will be taken to provide supplementary data for waste profiling and inventory transfer to the evaporation pond, to determine worker safety issues for operations and maintenance, to serve as QA of the waste disposed to the landfill, to provide a signature in the leachate for comparison with the groundwater monitoring program, and to provide operational data. Liquid samples from the PLDRS and SLDRS will be used to identify trends in the leak detection liquid over time. Liquid and/or sediment samples from the evaporation pond will be taken to ensure compliance with the evaporation pond WAC, to determine worker safety issues for operations and maintenance, to provide operational data, and to support IDAPA compliance, NESHAP compliance, and SLERA monitoring. Decontamination water samples from the pump station will be collected to provide operational data and as part of a "Remedial Action Work Plan" commitment (DOE-ID 2003a). Increased sampling frequency or chemical sampling of the PLDRS and LDRS would only occur if the ALR is exceeded. The ALR flow measurement and response plan for the landfill and evaporation pond is discussed in Section 4 of the O&M Plan (DOE-ID 2003b).

3.1 State the Problem

The problem is to determine if the accumulation of constituents in leachate, leak detection liquid, evaporation pond liquid, evaporation pond sediment, or pump station liquid is such that operation of the ICDF Complex is impacted. Operation of the ICDF Complex may be impacted and would require further evaluation based upon the following:

- SLERA constituent concentrations in the evaporation pond liquid and sediment
- NESHAP constituent concentrations in the evaporation pond liquid
- IDAPA constituent concentrations in the evaporation pond liquid

- Constituent concentrations in the LCRS leachate
- Field parameters in the PLDRS and SLDRS liquid
- Constituent concentrations in the pump station decontamination and washdown water.

This ICDF Complex operational impact problem statement will be further evaluated in the following sections to develop appropriate data quality objectives for collection of routine chemical data.

3.2 Identify the Decision

The objective of the ICDF monitoring program is to answer the following principal study questions:

- Are the concentrations of SLERA constituents in the evaporation pond liquid or sediment such that ICDF operations are impacted?
- Are the concentrations of NESHAP constituents in the evaporation pond liquid such that ICDF operations are impacted?
- Are the concentrations of IDAPA constituents in the evaporation pond liquid such that ICDF operations are impacted?
- Are the concentrations of constituents in the LCRS leachate such that ICDF operations are impacted?
- Are the results of field parameters in the PLDRS and SLDRS liquid such that ICDF operations are impacted?
- Are the concentrations of constituents in the pump station decontamination and washdown water such that ICDF operations are impacted?

The alternative actions associated with the above principal study questions are

- If the leachate in the LCRS, liquid in the PLDRS and SLDRS, liquid in the pump station, or liquid and/or sediments in the evaporation pond cells contain concentrations of hazardous constituents or other parameters relevant to operations and may impact the operation of the ICDF, *then* options to mitigate the problem will be evaluated.
- *If* conditions at the ICDF Complex indicate that concentrations of leachate in the LCRS, liquid in the PLDRS and SLDRS, liquid in the pump station, and liquid and sediment from the evaporation pond cells are all in compliance with operational requirements, *then* no action will be taken.

The principal study question and alternative actions are then combined into the following decision statement:

- Determine if concentrations of radioactive or hazardous constituents in the LCRS leachate, PLDRS and SLDRS liquid, evaporation pond liquid and sediment, and pump station liquid are within operational parameters to decide whether ICDF Complex operations may either continue without action being taken or whether possible actions must be evaluated.

3.3 Identify Decision Inputs

The information needed to resolve the decision statement is the identification and quantification of the constituents identified in the *Groundwater Monitoring Plan* (DOE-ID 2002b); SLERA, NESHAP, and IDAPA monitoring requirements (EDF-2236, EDF-ER-311, EDF-ER-290, EDF-2237); and design information. Table 1 further specifies constituents that need to be quantified.

To resolve the decision statement, the concentrations of the identified hazardous constituents and radionuclides present in the leachate in the LCRS, pump station decontamination and washdown water, and liquid and sediment in the evaporation pond cells must be determined. Further, field measurements of the liquid in the PLDRS and SLDRS shall be taken. A determination of whether or not ICDF Complex operations are impacted will be based on the achievement of performance standards that are identified in the ICDF Complex WAC (DOE-ID 2002d), ICDF evaporation pond WAC (DOE-ID 2002a), ICDF Complex O&M Plan (DOE-ID 2003b), EDF-ER-290, and EDF-2237. Actions will be evaluated if data show that ICDF Complex operations are impacted.

Action limits for the concentrations of As, Se, V, and Zn in the evaporation pond liquid and sediment will be based upon SLERA acceptable leachate concentrations identified in Section 3.4 of the ICDF Complex O&M Plan.

Action limits for the concentrations of ^{129}I, ^{60}Co, ^{137}Cs, ^{90}Sr, ^{238}Pu, and ^{234}U in the evaporation pond cells will be based on NESHAP requirements. NESHAP requirements for the sum of emissions from all INEEL facilities state that off-Site human exposure to airborne radionuclides must be less than 10 mrem/yr. However, the ICDF goal outlined in the WAC is 1 mrem/yr (DOE-ID 2002d). Annual modeling of constituent concentrations in the pond cell liquid will be done to correlate these concentrations to airborne exposures. EDF-ER-290 evaluated the expected NESHAP compliance to the ICDF goal, based upon conservative assumptions of ICDF evaporation pond liquid. The modeled evaporation pond liquid concentrations, presented in Table 5 of EDF-ER-290, will be used as the action limit for NESHAP requirements. It should be noted, however, that the total estimated dose at the INEEL boundary from the ICDF evaporation pond, based upon the assumptions and calculations presented in EDF-ER-290, is 5.33×10^{-4} mrem/yr, well below the 1 mrem/yr goal. Exceedance of the NESHAP action limits would not necessarily mean that the ICDF NESHAP goal has been exceeded.

Action limits for the concentrations of benzo(a)pyrene, hexachlorobenzene, hexachlorobutadiene, Hg, naphthalene, and hexachlorocyclopentadiene in the evaporation pond liquid will be based upon IDAPA operational limits for the evaporation pond identified in Section 3.2 of the ICDF Complex O&M Plan (calculated in EDF-2237).

Action limits for all other constituents and conditions are specified in the evaporation pond WAC (DOE-ID 2002a).

Action limits for the leachate in the LCRS will be based upon predicted leachate concentrations calculated in EDF-ER-274. When leachate concentrations in the LCRS exceed the maximum leachate concentrations presented in Table C.4 of Appendix C of EDF-ER-274, the sampling frequency of LCRS leachate sampling will be increased from twice each year to four times each year.

Action limits for the PLDRS and SLDRS are not established for field parameters, as these measurements are taken for long-term trending of water quality.

Table 2 provides a summary of the action limits established for the ICDF Complex routine sampling.

Table 1. Identification of constituents to be sampled.

Location to be Sampled	Constituents	Driver
Liquid and sediment in evaporation pond cells	As, Se, V, Zn	SLERA
Liquid in evaporation pond cells	^{129}I, ^{60}Co, ^{137}Cs, ^{90}Sr, ^{238}Pu, ^{234}U	NESHAP
Liquid in evaporation pond cells	Hg, Appendix IX semivolatile organic compounds[a]	IDAPA
Liquid and sediment in evaporation pond cells and leachate in landfill LCRS	Field parameters (pH, specific conductance, and temperature) - liquid only Appendix IX volatile and semivolatile organic compounds[a] Appendix IX OC pesticides and PCBs[a,b] Appendix IX OC herbicides[a,b] Appendix IX OP pesticides[a,b] Appendix IX PCDDs/PCDFs[a,b] Radionuclides (^{3}H, ^{129}I, ^{99}Tc, ^{90}Sr, ^{238}Pu, $^{239/240}Pu$, ^{234}U, ^{235}U, ^{238}U, gamma spectroscopy) Appendix IX metals, filtered (filtered and unfiltered for pond liquid)[a] Major cations and anions (calcium, potassium, magnesium, sodium, nitrate, sulfate, bicarbonate, chloride)	Evaporation pond WAC compliance, assessment of operations, QA of waste disposed to the landfill, develop leachate signature, waste inventory transfer to the evaporation pond and evaporation pond waste profile
PLDRS and SLDRS	Field parameters (pH, specific conductance, and temperature)	Assessment of operations
Pump station decontamination and washdown water	Total suspended solids, oil, and grease	Remedial Action Work Plan commitment

a. Appendix IX refers to Appendix IX of 40 CFR 264.

b. Analyses will be performed for only those analytes known to have been disposed to the landfill or evaporation pond.
PCDD = polychlorinated dibenzo-p-dioxin
PCDF = polychlorinated dibenzofuran
OC = organochlorine
OP = organophosphorus

Table 2. Identification of action limits for routine ICDF Complex sampling.

Location/Media to be Sampled	Constituent	Action Limit	Driver/Source
Evaporation pond liquid and sediment	As	6 mg/L (liquid) 5,900 ppb dry weight (sediment)	SLERA/ Section 3.4 O&M Plan
	Se	0.07 mg/L (liquid) 290 ppb dry weight (sediment)	
	V	3 mg/L (liquid) 50,000 ppb dry weight (sediment)	
	Zn	8 mg/L (liquid) 123,100 ppb dry weight (sediment)	
Evaporation pond liquid	^{129}I	---[a]	NESHAP/ EDF-ER-290
	^{60}Co	1.9E+04 pCi/L	
	^{137}Cs	4.9E+04 pCi/L	
	^{90}Sr	1.9E+06 pCi/L	
	^{238}Pu	1.7E+03 pCi/L	
	^{234}U	1.0E+03 pCi/L	
Evaporation pond liquid	Benzo(a)pyrene	3.11E+02 mg/L	IDAPA/ Section 3.2 O&M Plan
	Hexachlorobenzene	6.00E-02 mg/L	
	Hexachlorobutadiene	4.86E+04 mg/L	
	Hg	4.07E+02 mg/L	
	Naphthalene	2.17E+04 mg/L	
	Hexachloro-cyclopentadiene	6.84E-01 mg/L	
Evaporation pond liquid	All sampled constituents	See source	Evaporation pond WAC (DOE-ID 2002a)
Pump station liquid	Total suspended solids Oil and grease	See source	Evaporation pond WAC (DOE-ID 2002a)
LCRS leachate	All sampled constituents	Maximum predicted leachate concentration (see source)	Quality assurance of landfill waste/Table C.4 in Appendix C of EDF-ER-274
PLDRS and SLDRS liquid	Field parameters (pH, specific conductance, temperature)	No action limit	None

a. EDF-ER-290 assumed that gaseous radionuclides are assumed to be released at the landfill; hence, there would not be any remaining in the leachate; no action limit established.

3.4 Define Study Boundaries

The target population is the set of all environmental samples from which conclusions are to be drawn. The target population for monitoring activities outlined in this SAP consists of the leachate in the LCRS, liquid in the PLDRS and SLDRS, all of the liquid and sediment in the evaporation pond cells, and all of the liquid in the pump station.

The spatial boundaries of this ICDF Complex study are the contents of the evaporation pond cells, LCRS, PLDRS, SLDRS, and pump station.

The ICDF Complex is to be in operation for 15 years. At the end of that time, the ICDF Complex will be closed and a 30-year-postclosure-monitoring period will ensue. The monitoring procedures outlined in this SAP will take place during the 15-year period when the ICDF Complex is accepting waste. Some sampling will continue after the closure of the landfill and before the closure of the evaporation pond. At the time of closure, this SAP will be reevaluated to determine if any changes are necessary for the closure and postclosure period.

Practical sampling constraints include the possibility of inadequate amounts of leachate, leak detection liquid, or evaporation pond liquid for sampling and/or all required analyses. If this occurs, the operational conditions will be documented.

3.5 Develop Decision Rule

The decision rule must be specified in terms of a parameter that characterizes the population of interest. The parameter of interest for the liquid and sediment in the evaporation pond cells, the leachate in the LCRS, and the liquid in the pump station is the mean concentrations of the constituents of concern in each of the evaporation pond cells, LCRS, and pump station.

Action limits are established based upon SLERA, NESHAP, and IDAPA requirements, as described in Section 3.4, the WAC for the ICDF Complex (DOE-ID 2002d), and calculated leachate concentrations presented in EDF-ER-274. There are no established decision rules for field parameters collected from the PLDRS and SLDRS. Specific action limits are used to develop the following decision rules:

- *If* the concentration for any SLERA constituent outlined in Table 2 exceeds the action limit, *then* the corrective action approach for ICDF Complex routine sampling will be implemented.

- *If* the concentration for any NESHAP constituent outlined in Table 2 exceeds the action limit, *then* the corrective action approach for ICDF Complex routine sampling will be implemented.

- *If* the concentration for any IDAPA constituent outlined in Table 2 exceeds the action limits, *then* the corrective action approach for ICDF Complex routine sampling will be implemented.

- *If* the concentration for any evaporation pond liquid constituent outlined in Table 2 exceeds the action limits established in the evaporation pond WAC, *then* the corrective action approach for ICDF Complex routine sampling will be implemented.

- *If* the concentration for any pump station liquid constituent outlined in Table 2 exceeds the action limits established in the evaporation pond WAC, *then* the corrective action approach for ICDF Complex routine sampling will be implemented.

- *If* the concentration for any LCRS leachate constituent outlined in Table 2 exceeds the action limits established using the maximum predicted maximum leachate concentrations presented in Table C.4 of Appendix C in EDF-ER-274, *then* the sampling frequency for LCRS sampling will be increased from two times each year to four times each year, and the corrective action approach for ICDF Complex routine sampling will be implemented.

The corrective action approach for ICDF Complex routine sampling action limit exceedances is defined as follows:

1. The Agencies will be informed of the action limit exceedance (e.g., during routine conference calls, via email).

2. Data will be evaluated to determine whether an actual exceedance has occurred (e.g., data validation, QA/QC samples).

3. Data and operating conditions of the ICDF Complex will be evaluated to develop a hypothesis for the source/reason for the exceedance; if possible and practical, actions to evaluate the validity of the hypothesis will be performed. Operational procedure adjustments will be evaluated as a means to mitigate the action limit exceedance.

4. Evaluate whether additional or repeat sampling and analysis would be beneficial to better assess the action limit exceedance.

5. The action limits will be assessed to determine whether there have been any changes to the assumptions used to determine the action limits or whether additional calculations can be performed to more accurately define the action limits; based upon any new information, determine whether the action limit remains valid.

6. When appropriate and necessary, additional corrective actions will be developed based upon the particular action limit exceedance.

3.6 Specify Decision Error Limits

Monitoring of the ICDF Complex will be done by taking one sample of leachate from the LCRS sump, one sample each from the PLDRS and SLDRS, one sample each of sediment and liquid near the outfall at each evaporation pond cell, and one sample of liquid from the pump station. The results from the evaporation pond, LCRS, PLDRS, SLDRS, and pump station samples will be compared to the action level, if established. Since only one sample is being taken for comparisons, null and alternative hypotheses and decision error rates cannot be defined for this sampling method.

3.7 Optimize Data Collection Design

Monitoring of the ICDF Complex will be done by taking one sample of leachate from the LCRS sump, one sample of liquid each from the PLDRS and SLDRS, one sample each of liquid and sediment near the out-fall at each evaporation pond cell, and one sample of liquid from the pump station. The constituent concentration obtained from the evaporation pond, LCRS, and pump station samples will be compared to the action level. If the concentration of any constituent in either evaporation pond cell, the LCRS, or pump station exceeds the action level, the decision rules described in Section 3.5 will be used. If all constituent concentrations are less than the action level, then no action will be taken. Field parameters measured from the PLDRS and SLDRS liquid have no established decision rule; this data will be tracked with time.

Sampling of the LCRS sump will be conducted twice each year, approximately to coincide with the start of operations each year and the end of operations each year. If results of LCRS sampling require an increased sampling frequency (four times each year), sampling will approximately coincide with the start of operations, approximately half-way through the operation cycle, the end of operations, and approximately half-way through the winter shut-down cycle. Sampling of the LCRS will also be conducted monthly for key indicator parameters. Sampling of the PLDRS and SLDRS will be conducted annually, if sufficient water exists for sampling.

Sampling of the water and sediment in the evaporation pond will be conducted annually for SLERA, NESHAP, and IDAPA constituents, and every 5 years for an expanded set of analytes to assess evaporation pond WAC compliance. Sampling of the pump station will be performed annually, unless more frequently is requested by the ICDF Complex operations manager.

4. DOCUMENTATION AND DATA MANAGEMENT

Documentation involves the recording of all events relating to field and laboratory activities. Typical field documentation includes field logbooks, sample labels, and chain-of-custody (COC) forms. Sample handling procedures include COC, radiological field screening, sample-derived and investigation-derived waste packaging, and transport of samples to the laboratory.

4.1 Documentation

Field activities related to sample collection, site safety, and sample custody must be recorded in the field logbook to document that sampling, analysis, and data reporting activities are conducted in accordance with project DQOs and appropriate safety procedures. In addition, all laboratory activities relating to sample custody, sample preparation, sample analysis, and data reporting must be recorded to ensure that laboratory data can be confidently assigned to field sample points.

The laboratory will perform all functions required for ICDF Complex samples in accordance with a QAPjP. Audits may occur to demonstrate that the lab meets capability and quality requirements.

4.1.1 Field Documentation

The following sections provide a summary of requirements for adequate field documentation. All field documentation, document control, and daily updating of field logbooks and field materials will be the responsibility of ICDF Complex operations.

4.1.1.1 Sample Container Labels. Sample and Analysis Management (SAM) will provide sample container labels. The labels will include information relevant to the sample. Additional information that must be entered on the label includes

- Date of sample collection
- Time of sample collection
- Sampler name
- Sample location
- Field identification number (preprinted on labels provided).

4.1.1.2 Sample Numbering Scheme. Each sample will be assigned a unique identification number. A systematic 10-character code will be used to number samples. For the ICDF Complex samples, the first three characters will be assigned by the INEEL and will refer to the system being sampled. Characters 4, 5, and 6 are designated by the project. The seventh and eighth characters refer to the sample number collected for each analysis ("01" for the first sample collected and "02" if a duplicate is collected for the same analysis at that location). The ninth and tenth characters refer to a particular class of analysis.

4.1.1.3 Field Sampling Logbooks. Field logbooks are legal documents; they are the written record for all field data gathered, field observations, field equipment calibrations, samples collected for laboratory analysis, and initiation of sample custody. They also are maintained to document field activities as they relate to site safety meetings and health and safety procedures. Field logbooks will be bound, and they will contain consecutively numbered pages. All entries in field logbooks will be made

using permanent ink pens or markers. At a minimum, the following entries will be made in the field logbook:

- Identification of all sampling team members
- References to field methods used to obtain samples, field data, etc.
- Location and description of each sampling point
- Types, numbers, and volumes of samples (when observable)
- Date and time of sample collection
- Sample identification number
- Date and time of sample shipping or transfer of sample custody
- Observed weather conditions
- All field measurements
- Any deviations from the standard or expected procedure
- COC form numbers.

All mistakes made as entries will be amended by drawing a single line through the entry. The person making the correction will initial and date the correction.

4.1.1.4 Chain of Custody Record. COC procedures will begin immediately after collection of the first sample. At the time of sample collection, the sampling team will initiate a COC, ensuring each sample is recorded on a COC form. All samples collected will then remain in the custody of a sampling team member until custody is transferred to the laboratory sample custodian. Custody seals will be used when shipping samples to an off-Site laboratory to ensure custody is maintained during shipping. Upon receipt at the laboratory, the sample custodian will ensure custody seals are intact and will review sample labels and the COC form to ensure completeness and accuracy. The laboratory sample custodian will sign and date the COC form, signifying acceptance of delivery and custody of the samples. If discrepancies are noted during this review, immediate corrective action will be sought with the field team leader or other cognizant personnel. The INEEL will notify samplers. If errors cannot be corrected, the ICDF operations manager will be sought to correct sample labeling or COC errors.

The sampling team will retain a copy of the signed COC and will note the time of sample custody transfer in the field logbook. The pink carbon copy of the COC will be forwarded to the INEEL for tracking purposes. Sufficient copies of COCs will be made at the time of sample delivery to ensure that appropriate personnel have copies. The laboratory will maintain possession of the original copy of the COC until completion of sample analysis and will maintain one copy of the COC form for the term of data storage at the laboratory. The original copy of the COC will be returned to the SAM along with the original final data package deliverable. All mistakes made as entries will be amended by drawing a single line through the entry. The person making the correction will initial and date the correction.

4.1.2 Laboratory Records

Laboratory personnel are required to document all activities involving sample receipt, processing, analysis, and data reporting. The following sections describe the laboratory records that will be generated for this project.

4.1.2.1 Sample Data. Sample data records contain the laboratory analysis results, such as the time and date that samples were analyzed to verify that they met prescribed holding times. These records include information on the overall number of samples analyzed in a given day, location of sample analysis (i.e., instrument identification number), any deviations from analysis standard operating procedures (SOPs) and/or methods. Corrective action steps taken to rectify situations that did not conform to laboratory SOPs and/or analytical methods (including steps taken to seek additional sample material, if required) are also noted in these records.

4.1.2.2 Sample Management Records. Sample management records document sample receipt, handling and storage, and scheduled analyses. The records verify that the COC and proper preservation were maintained, reflect any anomalies in the samples (such as receipt of damaged samples), note proper log-in of samples into the laboratory, and address procedures used to prioritize samples received to ensure that holding time requirements will be met.

4.1.2.2.1 Test Methods—Unless analyses are performed exactly as prescribed in the analytical methods or laboratory SOPs, this documentation describes how the laboratory carried out the analyses. Items to be documented include sample preparation and analysis, instrument standardization, detection and reporting limits, and test-specific QC criteria. Documentation demonstrating laboratory proficiency with each method used could also be included in this category.

4.1.2.2.2 QA/QC Reports—These reports will include general QC records, such as initial demonstration of the capabilities of individual analysts to conduct specific analyses, instrument calibration, routine monitoring of analytical performance (e.g., control charts), and calibration verification. Project-specific information from the QA/QC checks such as blanks (e.g., field, reagent, and method), matrix, matrix spike duplicate, surrogate samples, calibration check samples (e.g., zero check, span check, and mid-range check), replicates, and splits should be included in these reports to facilitate data quality analysis. Specific requirements for the reporting format and quantity and types of QA/QC monitoring will be specified in the analytical statement of work to the laboratory.

4.2 Document Control

Document control consists of the clear identification of all project-specific documents in an orderly form, secure storage of all project information, and controlled distribution of all project information. Document control ensures controlled documents of all types related to the project will receive appropriate levels of review, comment, and revision as necessary.

The ICDF operations staff is responsible for ensuring documents are submitted to Document Control. Hard-copy information and documentation includes copies of field logbooks, field and laboratory COC forms, laboratory reports and data, engineering calculations and drawings, final design reports, and all other technical reports related to the project. Sampling records will be retained in accordance with Section 10 of the O&M Plan (DOE-ID 2003b).

4.3 Data Management

Data management consists of controlling the data generated and other data collected for use (e.g., existing data) during this investigation. All data will be controlled using the document control processes described in Section 4.2 and in accordance with company policy. Data will be made available for retrieval upon request.

4.4 Data Evaluation

Following data validation and data quality assessment (DQA), the data will be used to make decisions relative to the performance of the ICDF evaporation pond and leachate. The single concentrations generated will be used as the sample mean for each constituent of concern in each stratum being sampled (pond liquid, pond sediment, and sump contents). These concentrations will be compared to the action limits to determine if the performance standards have been met.

The constituent concentration obtained from the evaporation pond, LCRS, and pump station samples will be compared to the action limit. If the action limit is exceeded for any constituent in the leachate, either evaporation pond cell, or pump station, the decision rules established in Section 3.5 will be followed. If all constituent concentrations are less than the action level then no action will be taken. Field parameter data from the PLDRS and SLDRS will be tracked.

5. SAMPLING PROCESS DESIGN

5.1 Sample Collection

This section describes the sample collection and transport procedures that will be used to ensure the data collected is of known quality and meets the QC for usability. In accordance with the Federal Facility Agreement and Consent Order (DOE-ID 1991), the Agencies will be notified prior to a planned sampling event.

5.1.1 Sample Location and Frequency

Samples will be collected monthly for key indicator parameters and twice each year from the landfill LCRS sump for other parameters for QA of the waste disposed to the landfill, contaminant inventory transfer to the evaporation pond, and to provide operational information. Field parameters will be obtained annually from the PLDRS and SLDRS to provide a trend of operational data. Sampling of the evaporation pond water to support NESHAP calculations and IDAPA compliance, and water and sediment for SLERA monitoring will be conducted annually. Sampling of evaporation pond water and sediment to support WAC compliance will be performed every 5 years. Table 3 contains a list of sampling locations, frequencies, and analytes of interest. The specific sample locations for the evaporation pond liquid and sediment samples will be selected as specified in Section 6 of this SAP.

One constituent, benzidine, identified through IDAPA modeling with an operational limit less than the evaporation pond WAC, will not be analyzed from the evaporation pond liquid. The operational limit for benzidine (Section 3.2 of the O&M Plan) is 10 orders of magnitude higher than the maximum expected leachate concentration (Table C.4 of Appendix C in EDF-ER-274). In addition, benzidine was only included in the design inventory because it was a tentatively identified compound from one INEEL CERCLA remediation site.

Sampling of the pump station will be performed annually, unless requested more frequently by the ICDF Complex operations manager. The samples will be collected at the pump station.

5.1.2 Sample Preservation and Chain of Custody

Water samples will be preserved according to the requirements listed in Table 5-2 of the QAPjP (DOE-ID 2002c). The COC procedures also will follow the QAPjP.

5.1.3 Field Radiological Control Screening

If necessary, a gamma-screening sample will be collected and submitted to an on-Site laboratory for a 20-minute analysis before shipment to an off-Site laboratory. If the contact readings on the samples exceed 200 mrem/hr beta/gamma, the samples will be held for analysis at an on-Site laboratory.

5.1.4 Sample Containers

Sample containers for specific analysis are shown in Table 4 and were selected in accordance with the QAPjP (DOE-ID 2002c). Samples for volatile organic compound (VOC) analysis require no headspace. All other bottles for water samples will be filled to approximately 90 to 95% of capacity to allow for content expansion or preservation. Samples requiring acidification will be acidified to a pH < 2 using ultra-pure nitric acid or sulfuric acid. Sample containers will be stored in a secured area accessible only to authorized personnel.

Table 3. Sample locations, frequency, and analysis.

Sampling Location	Sampling Media and Frequency	Analytes[a]
LCRS sump	Leachate Monthly	^{129}I Field parameters (pH, specific conductance, and temperature)
LCRS sump	Leachate Twice each year[b]	Appendix IX volatile and semivolatile organic compounds Appendix IX metals plus Ca, K, Mg, Na (filtered) Appendix IX OC pesticides and PCBs[c] Appendix IX OC herbicides[c] Appendix IX OP pesticides[c] Appendix IX PCDDs/PCDFs[c] Radionuclides (^{3}H, ^{129}I, ^{99}Tc, ^{90}Sr, $^{239/240}Pu$, ^{238}Pu, ^{234}U, ^{235}U, ^{238}U, gamma spectroscopy) Major anions (nitrate, sulfate, bicarbonate, chloride) Field parameters (pH, specific conductance, and temperature)
PLDRS and SLDRS	Leak detection liquid Annual	Field parameters (pH, specific conductance, and temperature)
Evaporation pond cells	Water and sediments Annual	Metals includes As, Hg, Se, V, and Zn (unfiltered for liquid samples, Hg is not analyzed in sediments) Radiological for ^{129}I, ^{137}Cs, ^{90}Sr, ^{238}Pu, ^{60}Co, ^{234}U (water samples only) Gamma spectrometry (water samples only) Appendix IX semivolatile organic compounds (water samples only)
Evaporation pond cells	Water and sediments Every 5 years	Same as for the LCRS sump (except unfiltered metals samples will also be collected; Ca, K, Mg, Na, nitrate, sulfate, bicarbonate, and chloride for water samples only)
Pump station	Water and sediments Annual	Total suspended solids Oil and grease

a. Appendix IX refers to Appendix IX of 40 CFR 264.

b. Sampling frequency increased to four times each year when action limit from Table 2 is exceeded for any constituent.

c. Analyses will be performed for only those analytes known to have been disposed to the landfill or evaporation pond.

PCDD = polychlorinated dibenzo-p-dioxin
PCDF = polychlorinated dibenzofuran
OC = organochlorine
OP = organophosphorus

Table 4. Sampling analyte list, containers, and handling.

Matrix	Target Analyte List[a,b]	Container			Preservative	Holding Time
		Size	Type[c]	Minimum Sample Quantity		
Water	Appendix IX VOCs	2 × 40 mL[d]	G, V	80 mL	Cool to 4°C, pH < 2 with H_2SO_4, no headspace	14 days
Sediment	Appendix IX VOCs	120 mL	G	60 g	Cool to 4°C, no headspace	14 days
Water	Appendix IX SVOCs	1 L[d]	AG	1 L	Cool to 4°C	7 days
Sediment	Appendix IX SVOCs	250 mL	W, G	90 g	Cool to 4°C	14 days
Water	Appendix IX PCDDs/PCDFs	1 L[d]	AG	1 L	Cool to 4°C	7 days
Sediment	Appendix IX PCDDs/PCDFs	250 mL	W, G	90 g	Cool to 4°C	14 days
Water	Appendix IX metals plus Ca, K, Mg, Na	2 L	G	1,800 mL	Cool to 4°C	180 days 28 days (Hg)
Sediment	Appendix IX metals plus Ca, K, Mg, Na	60 mL	G or P	20 g	Cool to 4°C	180 days 28 days (Hg)
Water	Appendix IX OC pesticides and PCBs	1 L[d]	AG	1 L	Cool to 4°C	7 days
Sediment	Appendix IX OC pesticides and PCBs	250 mL	W, G	90 g	Cool to 4°C	14 days
Water	Appendix IX OP pesticides	1 L[d]	AG	1 L	Cool to 4°C, pH 3 to 8 with H_2SO_4 or NaOH (for OP pesticides)	7 days
Sediment	Appendix IX OP pesticides	250 mL	W, G	90 g	Cool to 4°C	7 days
Water	Appendix IX OC herbicides	1 L[d]	AG	1 L	Cool to 4°C	7 days
Sediment	Appendix IX OC herbicides	250 mL	W, G	90 g	Cool to 4°C	14 days
Water	Nitrate (as N), sulfate, bicarbonate, chloride (alkalinity)	125 mL	G or P	75 mL	pH < 2 with H_2SO_4	28 days, except that alkalinity is 14 days
Water	Cyanide	2 L	G, P	1,500 mL	pH > 12 w/ NaOH	14 days

Table 4. (continued)

Matrix	Target Analyte List[a,b]	Container			Preservative	Holding Time
		Size	Type[c]	Minimum Sample Quantity		
Water	Total suspended solids (TSS)	1 L	G, P	500 mL	None required	28 days
Water	Oil and grease	1 L	G	1000 mL	Cool to 4°C	14 days
Water	^{234}U, ^{235}U, and ^{238}U; ^{238}Pu and $^{239/240}Pu$; and gamma spec	4 L	HDPE	4 L	HNO_3 to pH < 2	6 months
Water[e] (LCRS)	^{234}U, ^{235}U, and ^{238}U	500 mL	HDPE	300 mL	HNO_3 to pH < 2	6 months
Sediment	^{234}U, ^{235}U, and ^{238}U; ^{238}Pu and $^{239/240}Pu$; and gamma spec	16 oz	Squat jar	160 g	None required	6 months
Water	^{90}Sr	500 mL	HDPE	500 mL	HNO_3 to pH < 2	6 months
Sediment	^{90}Sr	16 oz	Squat jar	10 g	None required	6 months
Water	^{99}Tc	1 L	HDPE	1 L	HNO_3 to pH < 2	6 months
Water[e] (LCRS)	^{99}Tc	40 mL	HDPE	5 mL	HNO_3 to pH < 2	6 months
Sediment	^{99}Tc	16 oz	Squat jar	5 g	None required	6 months
Water	^{129}I and ^{3}H	8500 mL	AG	1100–8500 mL depending on detection limit	None required	6 months
Water[e] (LCRS)	^{129}I	40 mL	AG	0.5 mL	None required	6 months
Sediment	^{129}I and ^{3}H	16 oz	Squat jar	16 g	None required	6 months

a. Appendix IX refers to Appendix IX of 40 CFR 264.
   OC = organochlorine
   OP = organophosphorus
   PCDD = polychlorinated dibenzo-p-dioxin
   PCDF = polychlorinated dibenzofuran
   SVOC = semivolatile organic compound
   VOC = volatile organic compound.

b. For Appendix IX references, analyses will be performed for only those analytes known to have been disposed to the landfill or evaporation pond.

c. A = amber
   G = glass
   HDPE = high-density polyethylene bottle
   P = polyethylene
   V = vial
   W = wide mouth.

d. Once each sampling event, a triplicate volume of sample from the sampling location for each stratum (i.e., pond liquid and sump liquid) must be collected to allow sufficient volume for laboratory matrix spike/matrix spike duplicate analyses.

e. Sampler minimum sample quantities have been identified for these key LCRS sample analyses due to necessary method detection limits necessary to evaluate action limit exceedance.

5.1.5 Sample Transport

Samples will be shipped in accordance with applicable Department of Transportation requirements (49 CFR 171 through 49 CFR 178) and EPA sample-handling, packaging, and shipping methods (40 CFR 262). On-Site shipments will comply with Site-specific and Packaging and Transportation requirements for transporting samples within INEEL boundaries.

Custody seals will be placed on all shipping containers to ensure that tampering or unauthorized opening does not compromise sample integrity. Clear plastic tape will be placed over the seals to ensure that the seals are not damaged during shipment.

5.1.6 Waste Management

Wastes from sampling will be managed in accordance with the *ICDF Complex Operations Waste Management Plan* (DOE-ID 2003c).

6. SAMPLE COLLECTION PROCEDURES

This section describes the sample collection procedures and equipment to be used for the planned monitoring. Before commencing any sampling activities, a prejob briefing will be held with all work-site personnel to review the requirements of the sampling plan, the health and safety plan, and other work control documentation and to verify that all supporting documentation has been completed. After sampling, a postjob review will be conducted. All sampling will follow the current issues in company procedures.

6.1 Leachate Collection Recovery System Samples

Simple grab samples will be collected monthly for pH, specific conductance, temperature, and ^{129}I; grab samples and will be collected twice each year from the LCRS sump using dedicated pumps and analyzed for the constituents listed in Table 3. As discussed previously, there is the potential that the leachate collection system sumps may be dry during any sampling event. Field samplers will make a reasonable attempt to collect a sample and document the field and operational conditions. If insufficient water is available from the LCRS, the samplers will return the next workday to collect the remaining samples. If the volume is still insufficient, sampling will be considered complete.

The following is the preferred order for measurements and sample collection when sample volume is limited (justifications are in parentheses):

1. VOCs (limited sample volume required)

2. Radionuclides (preferred order of radionuclides is ^{129}I, ^{99}Tc, $^{234}U/^{235}U/^{238}U$, remaining radionuclides)

3. Metals, total chromium, mercury (chromium is an INEEL contaminant of concern; mercury is the only metal that exceeds background in the design inventory).

6.2 Leak Detection and Recovery System Sumps

Simple grab samples will be collected annually and analyzed for field parameters (pH, specific conductance, and temperature) from the PLDRS and SLDRS when liquid is available for sampling. Samples will be collected approximately in the spring of each year following the spring melt to allow for the maximum liquid in the sumps. If sufficient liquid is not present for sampling, samplers will not return until the following year.

6.3 Pond Liquid and Sediment Samples

Samples will be collected from each evaporation pond cell using simple biased sampling. One sample of liquid and one sample of sediment will be collected from each cell at or near the pipe discharge point, where the highest concentrations of the constituents of interest are expected. The samples will be collected from the pond bank using a simple grab sampler and transferred to sample containers. As discussed earlier, it is possible that at least one pond cell will be dry when sampling is scheduled. In the case of inadequate cell volumes for sampling, the operational conditions will be documented.

6.4 Pump Station Samples

Samples from the pump station near the Decon Building will be collected with a baler and transferred into sample containers. The pump station liquid will be sampled annually and analyzed for total suspended solids, oil, and grease. In addition, as part of the routine inspections, the operator will visually inspect the liquid on the water side of the oil-water separator. If there is a visible sheen on the water, the field supervisor may request additional sampling be performed. The liquid will be collected and sampled, and the liquid held until analytical results are returned. If results show less than 500 ppm organics, the water will be discharged to the evaporation pond. If samples from the oil-water separator indicate greater than 500 ppm organics, then a sample from the discharge side will be collected and analyzed for oil and grease.

7. ANALYTICAL METHODS

To ensure that data of acceptable quality are obtained, standard EPA laboratory methods or technically appropriate methods for radioanalytical determinations will be used to obtain project laboratory data according to the specified EPA methods and company requirements for radiological analysis. Analytical measurements and the reporting protocols that will be used to determine inorganic, organic, and radiochemical constituents are outlined in Table 5.

Determinations for metals, other inorganic constituents (e.g., anions, cyanide), and organic constituents will be performed by the methods presented in "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods" (EPA 1998) or the American Society for Testing and Materials methods listed in Table 5. Determinations for radionuclides will be conducted in accordance with statements of work prepared by the INEEL. The detection limits presented in Table 5 are minimum requirements for all analytes specified in this Sampling and Analysis Plan. However, detection limits for LCRS sampling will not necessarily require the same detection limits. The detection limits for the LCRS sampling are established as 10% of the LCRS action limits (identified in Table 2 of this document). In cases where 10% of the LCRS action limit cannot be achieved (e.g., practical quantitation limits), the detection limits presented in Table 5 will be used.

7.1 Analytical Laboratory

The laboratory chosen for conducting the analyses will have the appropriate level of qualified personnel, the appropriate instrumentation, an approved QA plan, approved analytical methods, and appropriate internal SOPs to perform the required analyses. The selected laboratory will be approved for use on INEEL samples as documented by their inclusion on the INEEL approved suppliers list. The QA plans and SOPs for the laboratory (or laboratories) selected for performing the required analyses will be available for review by project personnel.

Table 5. Analytical method source documents and method descriptions.

Analyte[a]	Analytical Method[b]	Detection Limits
Appendix IX metals	6010B (all except Hg, Pb, As, Sn, Se)	QAPjP[c]
Mercury	7470A (aqueous)	QAPjP[c]
	7471A (nonaqueous)	QAPjP[c]
Arsenic	7060A	QAPjP[c]
Lead	7421	QAPjP[c]
Tin	7870	800 μg/L
Selenium	7740	QAPjP[c]
Cyanide	9010B (9013 prep for solids)	QAPjP[c]
Appendix IX VOCs	8260B	QAPjP[c]
Appendix IX SVOCs	8270C	QAPjP[c]
Appendix IX OC Pesticides/PCBs	8081A/8082	QAPjP[c]
Appendix IX OC herbicides	8151A	QAPjP[c]
Appendix IX OP pesticides	8141A	QAPjP[c]
Appendix IX PCDDs/PCDFs	8280A	QAPjP[c]
Major anions	EPA Method 300.0[c]	Varies by analyte
Total suspended solids	EPA Method 160.2[d]	QAPjP[c]

Table 5. (continued)

Analyte[a]	Analytical Method[b]	Detection Limits
Oil/grease	EPA Method 413.1[d] or 413.2[d] or 9070	QAPjP[e]
Radionuclides		
^{3}H	LSC	400 pCi/L
^{129}I	LEPS or GFP	1 pCi/L
^{99}Tc	LSC or GFP	10 pCi/L
^{90}Sr	GFP	1 pCi/L
^{238}Pu, $^{239/240}Pu$	ALS	0.2 pCi/L
^{234}U, ^{235}U, ^{238}U	ALS	0.5 pCi/L
Gamma spectroscopy	GMS	30 pCi/L[e]

a. Appendix IX refers to Appendix IX of 40 CFR 262.

OC = organochlorine

OP = organophosphorus

PCDD = polychlorinated dibenzo-p-dioxin

PCDF = polychlorinated dibenzofuran.

b. Methods used for radionuclide analysis are laboratory-specific. The laboratory will use standard operating procedures based on standard analytical methods provided to the INEEL Sample and Analysis Management. Unless noted, methods are from SW-846 (EPA 1998).

ALS = alpha spectrometry
GFP = gas flow proportional
GMS = gamma spectrometry
LEPS = low energy photon spectrometry
LSC = liquid scintillation counting.

c. Source: DOE-ID (2002c).

d. To find sources for these methods, see Nelson (2001).

e. Based on ^{137}Cs, each other gamma isotope will have a detection limit commensurate with its photon yield and energy as related to the ^{137}Cs detection limit.

8. INSTRUMENT CALIBRATION PROCEDURES

To ensure that sampling and analysis activities obtain the most accurate and precise information possible, field equipment and laboratory instrumentation must be calibrated according to manufacturer specifications and the appropriate analytical method specifications.

8.1 Laboratory Instrument Calibration

Laboratory instrumentation will be calibrated in accordance with each of the specified analytical methods (Table 5). The laboratory QA plan will include requirements for calibrations when specifications are not listed in analytical methods. Calibrations that are typically not called out in analytical methods include ancillary laboratory equipment (e.g., analytical balances, pipettes, and pH meters) and verification of reference standards used for calibration and standard preparation.

Laboratory documentation will include calibration techniques and sequential calibration actions, performance tolerances provided by the specific analytical method, and calibration dates and frequency. In addition, records for all laboratory-prepared standards will be maintained and provided with each data deliverable. Instrument responses for gas chromatography/mass spectrometry, gas chromatography retention time window definitions, and documentation of calibration check precision for gas chromatography and gas chromatography/mass spectrometry systems will be reported in each deliverable. Standard reference materials used to perform calibration checks associated with both inorganic target analytes and radiochemical parameters will be independent from those used to prepare the calibration standards. The results of these calibration checks will be reported with each data deliverable.

All analytical methods prescribed in Table 5 have specifications for equipment checks and instrument calibrations. The laboratory will comply with all method-specific calibration requirements for all requested parameters as stated in SW-846 (EPA 1998) or an equivalent analytical procedure. If an instrument calibration error or equipment failure is detected, the instrument will be recalibrated and all affected samples will be analyzed using an acceptable calibration.

8.2 Field Equipment Calibration/Setup

The radiological control technician will be responsible for calibration of all radiological monitoring equipment and the placement and handling of all telemetry dosimeters. The industrial hygienist will be responsible for the measurement and evaluation of dosimeter results. All field calibrations will be documented in a field instrument calibration/standardization logbook in accordance with company policy.

8.3 Preventative Maintenance Procedures and Frequency

Field equipment will be managed using a calibration program compliant with company policy. All laboratory equipment will be maintained to a level such that each piece of equipment and each laboratory instrument can meet method-specific QA/QC tolerances. Maintenance will be performed under the supervision of qualified personnel on all laboratory instrumentation in accordance with the manufacturer's specifications, laboratory QA plan, and/or SOPs.

Preventive maintenance of field equipment will be conducted in accordance with appropriate facility SOPs. "EPA Requirements for Quality Assurance Project Plans" (EPA 2001) requires that all activities not governed by specific analytical procedures be completed under approved SOPs. If SOPs governing the inspection and maintenance of sampling equipment do not presently exist, they will be developed to ensure that sampling activities are conducted using equipment that is performing within manufacturer or design specifications.

9. DATA VALIDATION AND REPORTING

The generation of data in the field and by the laboratory is the first of several steps in evaluating conditions at a project site. After the data are generated, a series of evaluations and data reduction steps must be conducted to ensure that the data are acceptable and that the information is in a form that is usable by the end users.

9.1 Data Reduction

Data reduction is the process of converting raw data or instrument data into a usable form for evaluation by project personnel. In this case, the data reduction activities will convert the data into a form more usable for interpretive purposes for environmental risk assessment and verification of ICDF Complex operational compliance. Reduction of environmental data will take place at the laboratory.

Laboratory data reduction involves converting the outputs of the analytical instruments into sample and QC results. Laboratory reduction will be performed as defined in the analytical method. Laboratory deliverables include raw data and reduced data. This form of laboratory reporting will ensure (a) complete documentation of all aspects of laboratory analysis, (b) independent verification of reported results, (c) a form of data that is technically and legally defensible, and (d) complete confidence in the results.

9.2 Data Validation

Analytical data validation is the comparison of analytical results to the requirements established by the analytical method. Data validation is used to determine whether the analytical data are technically and legally defensible and reliable. Validation involves evaluating all sample-specific information generated from sample collection to receipt of the final data package by ICDF management. The applicable analytical method QC guidelines will be used to validate the data with the exception of radioanalytical data, which will be validated exclusively using company procedures. Data validation is one step of the DQA process that is used to determine whether the data meet the DQOs of the project. Additional steps of the DQA process are discussed in Section 9.3.

The final product of the validation process is the validation report. The validation report communicates the quality and usability of the data to the decision-makers from the perspective of compliance with the analytical method. The validation report will contain an itemized discussion of the validation process and results. Copies of the data forms annotated for qualification as discussed in the validation report will be attached to the report.

Validation for monthly LCRS sampling will be a cursory review, as defined by the INEEL SAM. The cursory review for the field parameters will be performed by checking the field logs for transcription errors and to verify that the field instrumentation was calibrated prior to use. All other samples collected under this SAP will be validated to Level B, as defined by the INEEL SAM. Data packages from the laboratory will be requested such that Level A validation (as defined by the INEEL SAM) could be performed in the future, should the need arise.

9.3 Data Quality Assessment

The DQA process is used to determine whether the data meet the project DQOs. In addition to data validation, the steps of the DQA process involve data plotting, testing for outlying data points, and statistical hypothesis testing relative to the null and alternative hypotheses stated in the DQOs. When statistical hypothesis testing is included in the sampling design, the outcome of the DQA process is a

statement that the statistical hypothesis testing suggests that the null hypothesis is accurate, that the null hypothesis has been rejected, or that not enough data exist to make a determinative conclusion based upon the hypothesis test used. In this latter case, either additional data must be collected to support the statistical hypothesis testing or the data user must make a decision with higher uncertainty than the levels expressed in the DQOs. In this sampling effort, because only one sample will be collected during each sampling event, there will be no statistical hypothesis testing conducted using the data.

Data that are not necessarily unusable may be flagged during the data validation process. Flagged data are reviewed during the DQA process to determine whether the validation flags affect the intended use of the data. The determination of whether flagged data are used in statistical hypothesis testing or, in the case of the sampling efforts described in this document, whether flagged data are used for comparison to action levels, is documented in the DQA report.

9.4 Data Use

Following data validation and DQA, the data will be used to make decisions relative to the performance of the ICDF evaporation pond and leachate. The single concentrations generated will be used as the sample mean (0) for each constituent of concern in each stratum being sampled (pond liquid, pond sediment, LCRS sump leachate, pump station liquid). These concentrations will be compared to the action limits to determine if the action limits have been exceeded. If the concentration for any constituent is greater than the action level, the decision rules identified in Section 3.5 will be used.

9.5 Reporting

Data packages received from the laboratory must conform to the criteria specified in the laboratory Statement of Work/Task Order Statement of Work.

10. INTERNAL QUALITY CONTROL CHECKS AND FREQUENCY

To adequately assess the quality of sampling techniques and the cleanliness of sampling and shipping methods and to help assess laboratory accuracy and precision, field QA/QC samples are submitted with natural samples at the time of custody transfer to the laboratory. The following sections outline specific QC checks that will take place for this project.

10.1 Laboratory Quality Control

Laboratory QA/QC procedures and strict adherence to analytical method tolerances are critical to obtaining high-quality laboratory data. Each analysis will strictly adhere to all QA/QC procedures, QA/QC control limits, and method-specific corrective actions.

10.2 Field Quality Control

Field QC is usually accomplished by using approved sampling procedures and monitored by using trip blanks, equipment blanks, and field blanks. Trip blanks are organic-free water in a 40-mL vial sent from the laboratory that will be performing the analyses. Trip blanks accompany VOC water samples during the sample collection and shipment processes. An alternative source of trip blank water is the INEEL Analytical Laboratories Department where reagent water that has been heated and prepurged with an inert gas. Trip blanks evaluate cross-contamination during sample handling, shipment, and storage. Field blanks are analyte-free water that is poured into a sample container at the sample collection site to check cross-contamination during sample collection and shipment. Equipment blanks consist of analyte-free water that is poured over decontaminated sampling equipment and collected in the appropriate sample containers, appropriately preserved, and sent to the laboratory for applicable analyses. Because only one sample will be collected during each sampling effort and dedicated or disposable sampling equipment will be used for each sample collection, no equipment blanks will be required for the routine sampling and analysis conducted at the ICDF Complex.

10.3 Inspection/Acceptance Requirements for Supplies and Consumables

Disposable sampling equipment will be checked before use to ensure it is made of material appropriate for the media being sampled. Sample containers will be obtained from vendors that certify the cleaning protocol used is appropriate for the analyses to be performed on the sample. Reagents used for sample preservation will be checked to ensure they are of the appropriate grade before use. Inspection and acceptance of these items will be documented in field logbooks or by inspection of certificates provided by the manufacturer, which are maintained in project files.

11. SYSTEM AND PERFORMANCE ASSESSMENTS, FREQUENCY, AND CORRECTIVE ACTION

This SAP does not require a formal audit of the analytical laboratory before commencing with ICDF leachate sampling. However, if deviations from the procedures outlined in this SAP are suspected during analysis, ICDF management should review the laboratory procedures that were used to obtain project data. In addition, an on-site meeting at the laboratory is encouraged to examine all procedures in action, examine the facilities that will be used to complete data gathering activities, and discuss the technical project activities and intended data uses with laboratory personnel.

11.1 System and Performance Assessments

A system assessment is an evaluation of an entire system to ensure it will meet the requirements of the project. An example of a system assessment is an on-site laboratory audit that ensures the sample receiving, sample storage, sample analysis, data reduction, and documentation procedures used at the laboratory will meet the requirements of the project.

A performance assessment is the evaluation of the performance of one aspect of a system. An example of a performance assessment is the insertion of performance evaluation samples to test the laboratory system. Performance evaluation samples are samples containing analytes of interest at known concentrations.

11.2 Corrective Action

Corrective action procedures are implemented whenever sampling, field monitoring, or laboratory analysis results do not meet the required QA/QC standards. The types of corrective actions applicable to environmental analysis are laboratory corrective action(s) and field corrective action(s).

11.2.1 Laboratory Corrective Action

The laboratory manager, laboratory QA officer, laboratory analysts, and ICDF management will be responsible for ensuring that all laboratory QA/QC procedures are followed. Situations requiring corrective action and the type of correction required will be as stated in the analytical method or the laboratory statement of work. The laboratory will use internal QA plans and SOPs to complete all corrective actions identified both internally and externally. Completion of corrective actions will require laboratory personnel to notify ICDF management of any laboratory situation that may affect the usability of the data. If ICDF management is notified of a laboratory nonconformance for which the laboratory seeks the project's required corrective action, the following activities will be performed:

- Devise a reasonable corrective action in conjunction with the laboratory staff and ICDF management
- Formally request the laboratory to implement the corrective action.

ICDF management and the laboratory QA officer will be responsible for monitoring the effectiveness of all corrective actions.

11.2.2 Field Corrective Action

ICDF management is responsible for ensuring that all field procedures are followed completely and that field personnel are trained adequately. ICDF management and staff must document situations that may impair the usability of the samples and/or data in the field logbook. ICDF staff will note any deviations from the standard procedures for sample collection, COC, sample transport, or any other monitoring that occurs. ICDF staff will also be responsible for coordinating all activities relating to the use of field monitoring equipment, such as dosimeters and industrial hygiene equipment. Ultimately, ICDF management will be responsible for communicating field corrective action procedures, documenting all deviations from procedures, and ensuring that immediate corrective actions are applied to field activities.

11.3 Reports to Management

ICDF management is responsible for ensuring that all field procedures are completely followed and field personnel are adequately trained. ICDF management and staff must document situations that may impair the usability of the samples and/or data in the field logbook. The ICDF staff will note any deviations that occur from the standard procedures for sample collection, COC, sample transport, or any other monitoring. The ICDF staff will communicate any deviations to management. ICDF management will be responsible for coordinating all activities relating to the use of field monitoring equipment (e.g., dosimeters and industrial hygiene equipment).

The radiological control technician and industrial hygienist will provide any notations to document out-of-compliance measurements taken during field sampling. Ultimately, ICDF management and staff will be responsible for effectively communicating field corrective action procedures, documenting all deviations from procedures, and ensuring that immediate corrective actions are applied to field activities.

12. REFERENCES

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Appendix A

Sampling and Analysis Plan Tables for Chemical and Radiological Analyses

Annual Pond Sampling

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table No.
SAP No. DOE/ID-11005
Date: 6/2002 Plan Table Revision: 0 Project: ICDF Complex Monitoring
Project Manager: Dan Crisp SAM Contact:

Sample Description					Planned Date	Sample Location				Enter Analysis Types (AT) and Quantity Requested							
Sampling Activity	Sample Type	Sample Matrix	Collection Type	Sampling Method	(Annual)	Area	Location	Location Type	Depth (ft)	AT 1	AT 2	AT 3	AT 4	AT 5	AT 6	AT 7	AT 8
ICD #	Reg	Water	Grab	TBD	2004	West	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Water	Grab	TBD	2004	East	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Sediment	Grab	TBD	2004	West	Near Out-fall	Evaporation Pond	NA	1							
	Reg	Sediment	Grab	TBD	2004	East	Near Out-fall	Evaporation Pond	NA	1							
	Reg	Water	Grab	TBD	2005	West	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Water	Grab	TBD	2005	East	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Sediment	Grab	TBD	2005	West	Near Out-fall	Evaporation Pond	NA	1							
	Reg	Sediment	Grab	TBD	2005	East	Near Out-fall	Evaporation Pond	NA	1							

General Notes

1. The sampling activity (sample number) will be assigned by an INEEL database. The complete number will appear on field guidance forms and sample labels.
2. The QAPjP recommends 1 duplicate sample be collected to a minimum frequency of 1/20 samples or 1/day/matrix.
3. Water and sediment samples will only be collected if sufficient volume can be found in the pond.

AT1: Metals (CLP TAL)
AT2: Gamma Spectroscopy
AT3: ^{129}I
AT4: ^{238}Pu
AT5: ^{90}Sr
AT6: ^{234}U
AT7: Appendix IX SVOCs
AT8:

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table No.
SAP No. DOE/ID-11005
Date: 6/2002 Plan Table Revision: 0 Project: ICDF Complex Monitoring
Project Manager: Dan Crisp SAM Contact:

Sample Description					Planned Date (Annual)	Sample Location				Enter Analysis Types (AT) and Quantity Requested							
Sampling Activity	Sample Type	Sample Matrix	Collection Type	Sampling Method		Area	Location	Location Type	Depth (ft)	AT 1	AT 2	AT 3	AT 4	AT 5	AT 6	AT 7	AT 8
ICD #	Reg	Water	Grab	TBD	2006	West	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Water	Grab	TBD	2006	East	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Sediment	Grab	TBD	2006	West	Near Out-fall	Evaporation Pond	NA	1							
	Reg	Sediment	Grab	TBD	2006	East	Near Out-fall	Evaporation Pond	NA	1							
	Reg	Water	Grab	TBD	2007	West	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Water	Grab	TBD	2007	East	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Sediment	Grab	TBD	2007	West	Near Out-fall	Evaporation Pond	NA	1							
	Reg	Sediment	Grab	TBD	2007	East	Near Out-fall	Evaporation Pond	NA	1							

General Notes

1. The sampling activity (sample number) will be assigned by an INEEL database. The complete number will appear on field guidance forms and sample labels.
2. The QAPjP recommends 1 duplicate sample be collected to a minimum frequency of 1/20 samples or 1/day/matrix.
3. Water and sediment samples will only be collected if sufficient volume can be found in the pond.

AT1: Metals (CLP TAL)
AT2: Gamma Spectroscopy
AT3: ^{129}I
AT4: ^{238}Pu
AT5: ^{90}Sr
AT6: ^{234}U
AT7: Appendix IX SVOCs
AT8:

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table No.

SAP No. DOE/ID-11005

Date: 6/2002 Plan Table Revision: 0 Project: ICDF Complex Monitoring

Project Manager: Dan Crisp SAM Contact:

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested							
Sampling Activity	Sample Type	Sample Matrix	Collection Type	Sampling Method	Planned Date (Annual)	Area	Location	Location Type	Depth (ft)	AT 1	AT 2	AT 3	AT 4	AT 5	AT 6	AT 7	AT 8
ICD #	Reg	Water	Grab	TBD	2008	West	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Water	Grab	TBD	2008	East	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Sediment	Grab	TBD	2008	West	Near Out-fall	Evaporation Pond	NA	1							
	Reg	Sediment	Grab	TBD	2008	East	Near Out-fall	Evaporation Pond	NA	1							
	Reg	Water	Grab	TBD	2009	West	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Water	Grab	TBD	2009	East	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Sediment	Grab	TBD	2009	West	Near Out-fall	Evaporation Pond	NA	1							
	Reg	Sediment	Grab	TBD	2009	East	Near Out-fall	Evaporation Pond	NA	1							

General Notes

1. The sampling activity (sample number) will be assigned by an INEEL database. The complete number will appear on field guidance forms and sample labels.
2. The QAPjP recommends 1 duplicate sample be collected to a minimum frequency of 1/20 samples or 1/day/matrix.
3. Water and sediment samples will only be collected if sufficient volume can be found in the pond.

AT1: Metals (CLP TAL)

AT2: Gamma Spectroscopy

AT3: ^{129}I

AT4: ^{238}Pu

AT5: ^{90}Sr

AT6: ^{234}U

AT7: Appendix IX SVOCs

AT8:

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table No.

SAP No. DOE/ID-11005

Date: 6/2002 Plan Table Revision: 0 Project: ICDF Complex Monitoring

Project Manager: Dan Crisp SAM Contact:

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested							
Sampling Activity	Sample Type	Sample Matrix	Collection Type	Sampling Method	Planned Date (Annual)	Area	Location	Location Type	Depth (ft)	AT 1	AT 2	AT 3	AT 4	AT 5	AT 6	AT 7	AT 8
ICD #	Reg	Water	Grab	TBD	2010	West	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Water	Grab	TBD	2010	East	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Sediment	Grab	TBD	2010	West	Near Out-fall	Evaporation Pond	NA	1							
	Reg	Sediment	Grab	TBD	2010	East	Near Out-fall	Evaporation Pond	NA	1							
	Reg	Water	Grab	TBD	2011	West	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Water	Grab	TBD	2011	East	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Sediment	Grab	TBD	2011	West	Near Out-fall	Evaporation Pond	NA	1							
	Reg	Sediment	Grab	TBD	2011	East	Near Out-fall	Evaporation Pond	NA	1							

General Notes

1. The sampling activity (sample number) will be assigned by an INEEL database. The complete number will appear on field guidance forms and sample labels.
2. The QAPjP recommends 1 duplicate sample be collected to a minimum frequency of 1/20 samples or 1/day/matrix.
3. Water and sediment samples will only be collected if sufficient volume can be found in the pond.

AT1: Metals (CLP TAL)

AT2: Gamma Spectroscopy

AT3: ^{129}I

AT4: ^{238}Pu

AT5: ^{90}Sr

AT6: ^{234}U

AT7: Appendix IX SVOCs

AT8:

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table No.

SAP No. DOE/ID-11005

Date: 6/2002 Plan Table Revision: 0 Project: ICDF Complex Monitoring

Project Manager: Dan Crisp SAM Contact:

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested							
Sampling Activity	Sample Type	Sample Matrix	Collection Type	Sampling Method	Planned Date (Annual)	Area	Location	Location Type	Depth (ft)	AT 1	AT 2	AT 3	AT 4	AT 5	AT 6	AT 7	AT 8
ICD #	Reg	Water	Grab	TBD	2012	West	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Water	Grab	TBD	2012	East	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Sediment	Grab	TBD	2012	West	Near Out-fall	Evaporation Pond	NA	1							
	Reg	Sediment	Grab	TBD	2012	East	Near Out-fall	Evaporation Pond	NA	1							
	Reg	Water	Grab	TBD	2013	West	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Water	Grab	TBD	2013	East	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Sediment	Grab	TBD	2013	West	Near Out-fall	Evaporation Pond	NA	1							
	Reg	Sediment	Grab	TBD	2013	East	Near Out-fall	Evaporation Pond	NA	1							

General Notes

1. The sampling activity (sample number) will be assigned by an INEEL database. The complete number will appear on field guidance forms and sample labels.
2. The QAPjP recommends 1 duplicate sample be collected to a minimum frequency of 1/20 samples or 1/day/matrix.
3. Water and sediment samples will only be collected if sufficient volume can be found in the pond.

AT1: Metals (CLP TAL)

AT2: Gamma Spectroscopy

AT3: ^{129}I

AT4: ^{238}Pu

AT5: ^{90}Sr

AT6: ^{234}U

AT7: Appendix IX SVOCs

AT8:

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table No.
SAP No. DOE/ID-11005
Date: 6/2002
Project Manager:

Plan Table Revision: 0
Dan Crisp

Project: ICDF Complex Monitoring
SAM Contact:

Sample Description					Planned Date	Sample Location				Enter Analysis Types (AT) and Quantity Requested							
Sampling Activity	Sample Type	Sample Matrix	Collection Type	Sampling Method	(Annual)	Area	Location	Location Type	Depth (ft)	AT 1	AT 2	AT 3	AT 4	AT 5	AT 6	AT 7	AT 8
ICD #	Reg	Water	Grab	TBD	2014	West	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Water	Grab	TBD	2014	East	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Sediment	Grab	TBD	2014	West	Near Out-fall	Evaporation Pond	NA	1							
	Reg	Sediment	Grab	TBD	2014	East	Near Out-fall	Evaporation Pond	NA	1							
	Reg	Water	Grab	TBD	2015	West	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Water	Grab	TBD	2015	East	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Sediment	Grab	TBD	2015	West	Near Out-fall	Evaporation Pond	NA	1							
	Reg	Sediment	Grab	TBD	2015	East	Near Out-fall	Evaporation Pond	NA	1							

General Notes

1. The sampling activity (sample number) will be assigned by an INEEL database. The complete number will appear on field guidance forms and sample labels.
2. The QAPjP recommends 1 duplicate sample be collected to a minimum frequency of 1/20 samples or 1/day/matrix.
3. Water and sediment samples will only be collected if sufficient volume can be found in the pond.

AT1: Metals (CLP TAL)
AT2: Gamma Spectroscopy
AT3: ^{129}I
AT4: ^{238}Pu
AT5: ^{90}Sr
AT6: ^{234}U
AT7: Appendix IX SVOCs
AT8:

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table No.
SAP No. DOE/ID-11005
Date: 6/2002 Plan Table Revision: 0 Project: ICDF Complex Monitoring
Project Manager: Dan Crisp SAM Contact:

Sample Description					Planned Date (Annual)	Sample Location				Enter Analysis Types (AT) and Quantity Requested							
Sampling Activity	Sample Type	Sample Matrix	Collection Type	Sampling Method		Area	Location	Location Type	Depth (ft)	AT 1	AT 2	AT 3	AT 4	AT 5	AT 6	AT 7	AT 8
ICD #	Reg	Water	Grab	TBD	2016	West	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Water	Grab	TBD	2016	East	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Sediment	Grab	TBD	2016	West	Near Out-fall	Evaporation Pond	NA	1							
	Reg	Sediment	Grab	TBD	2016	East	Near Out-fall	Evaporation Pond	NA	1							
	Reg	Water	Grab	TBD	2017	West	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Water	Grab	TBD	2017	East	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	
	Reg	Sediment	Grab	TBD	2017	West	Near Out-fall	Evaporation Pond	NA	1							
	Reg	Sediment	Grab	TBD	2017	East	Near Out-fall	Evaporation Pond	NA	1							

General Notes

1. The sampling activity (sample number) will be assigned by an INEEL database. The complete number will appear on field guidance forms and sample labels.
2. The QAPjP recommends 1 duplicate sample be collected to a minimum frequency of 1/20 samples or 1/day/matrix.
3. Water and sediment samples will only be collected if sufficient volume can be found in the pond.

AT1: Metals (CLP TAL)
AT2: Gamma Spectroscopy
AT3: ^{129}I
AT4: ^{238}Pu
AT5: ^{90}Sr
AT6: ^{234}U
AT7: Appendix IX SVOCs
AT8:

5-Year Pond Sampling

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table No.
SAP No. DOE/ID-11005
Date: 6/2002 Plan Table Revision: 0 Project: ICDF Complex Monitoring
Project Manager: Dan Crisp SAM Contact:

Sample Description					Planned Date	Sample Location				Enter Analysis Types (AT) and Quantity Requested															
Sampling Activity	Sample Type	Sample Matrix	Collection Type	Sampling Method	(Annual)	Area	Location	Location Type	Depth (ft)	AT 1	AT 2	AT 3	AT 4	AT 5	AT 6	AT 7	AT 8	AT 9	AT 10	AT 11	AT 12	AT 13	AT 14	AT 15	AT 16
ICD #	Reg	Water	Grab	TBD	2003	West	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Reg	Water	Grab	TBD	2003	East	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Reg	Sediment	Grab	TBD	2003	West	Near Out-fall	Evaporation Pond	NA			1	1	1	1	1	1		1	1	1	1	1	1	1
	Reg	Sediment	Grab	TBD	2003	East	Near Out-fall	Evaporation Pond	NA			1	1	1	1	1	1		1	1	1	1	1	1	1
	Reg	Water	Grab	TBD	2008	West	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Reg	Water	Grab	TBD	2008	East	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Reg	Sediment	Grab	TBD	2008	West	Near Out-fall	Evaporation Pond	NA			1	1	1	1	1	1		1	1	1	1	1	1	1
	Reg	Sediment	Grab	TBD	2008	East	Near Out-fall	Evaporation Pond	NA			1	1	1	1	1	1		1	1	1	1	1	1	1

General Notes

1. The sampling activity (sample number) will be assigned by the INEEL SAM database. The complete number will appear on field guidance forms and sample labels.
2. The QAPjP recommends 1 duplicate sample be collected to a minimum frequency of 1/20 samples or 1/day/matrix.
3. Sediment samples may be collected if sufficient volume can be found in the pond.

AT1: Appendix IX Metals (filtered) (plus Ca, Na, K, Mg)
AT2: Appendix IX Metals (unfiltered) (plus Ca, Na, K, Mg)
AT3: Appendix IX VOCs
AT4: Appendix IX SVOCs
AT5: Appendix IX OC Pest/PCBs
AT6: Appendix IX OC Herbicides
AT7: Appendix IX OP Pesticides
AT8: Appendix IX PCDD/PCDFs
AT9: Anions
AT10: ^{3}H (Tritium)
AT11: ^{129}I
AT12: ^{99}Tc
AT13: ^{90}Sr
AT14: ^{238}Pu, $^{239/240}Pu$
AT15: Gamma Spectroscopy
AT16: ^{234}U, ^{235}U, ^{238}U

Note: Analyses will be performed for only those constituents known to have been disposed to the landfill or pond.

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table No.
SAP No. DOE/ID-11005
Date: 6/2002 Plan Table Revision: 0 Project: ICDF Complex Monitoring
Project Manager: Dan Crisp SAM Contact:

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested															
Sampling Activity	Sample Type	Sample Matrix	Collection Type	Sampling Method	Planned Date (Annual)	Area	Location	Location Type	Depth (ft)	AT 1	AT 2	AT 3	AT 4	AT 5	AT 6	AT 7	AT 8	AT 9	AT 10	AT 11	AT 12	AT 13	AT 14	AT 15	AT 16
ICD #	Reg	Water	Grab	TBD	2013	West	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Reg	Water	Grab	TBD	2013	East	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Reg	Sediment	Grab	TBD	2013	West	Near Out-fall	Evaporation Pond	NA			1	1	1	1	1	1		1	1	1	1	1	1	1
	Reg	Sediment	Grab	TBD	2013	East	Near Out-fall	Evaporation Pond	NA			1	1	1	1	1	1		1	1	1	1	1	1	1
ICD #	Reg	Water	Grab	TBD	2018	West	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Reg	Water	Grab	TBD	2018	East	Near Out-fall	Evaporation Pond	NA	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Reg	Sediment	Grab	TBD	2018	West	Near Out-fall	Evaporation Pond	NA			1	1	1	1	1	1		1	1	1	1	1	1	1
	Reg	Sediment	Grab	TBD	2018	East	Near Out-fall	Evaporation Pond	NA			1	1	1	1	1	1		1	1	1	1	1	1	1

General Notes

1. The sampling activity (sample number) will be assigned by the INEEL SAM database. The complete number will appear on field guidance forms and sample labels.
2. The QAPjP recommends 1 duplicate sample be collected to a minimum frequency of 1/20 samples or 1/day/matrix.
3. Sediment samples may be collected if sufficient volume can be found in the pond.

AT1: Appendix IX Metals (filtered) (plus Ca, Na, K, Mg)
AT2: Appendix IX Metals (unfiltered) (plus Ca, Na, K, Mg)
AT3: Appendix IX VOCs
AT4: Appendix IX SVOCs
AT5: Appendix IX OC Pest/PCBs
AT6: Appendix IX OC Herbicides
AT7: Appendix IX OP Pesticides
AT8: Appendix IX PCDD/PCDFs
AT9: Anions
AT10: ^{3}H (Tritium)
AT11: ^{129}I
AT12: ^{99}Tc
AT13: ^{90}Sr
AT14: ^{238}Pu, $^{239/240}Pu$
AT15: Gamma Spectroscopy
AT16: ^{234}U, ^{235}U, ^{238}U

Note: Analyses will be performed for only those constituents known to have been disposed to the landfill or pond.

Leachate Collection and Recovery System Sampling

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table No.

SAP No. DOE/ID-11005

Date: 6/2002 Plan Table Revision: 0 Project: ICDF Complex Monitoring

Project Manager: Dan Crisp SAM Contact:

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested															
Sampling Activity	Sample Type	Sample Matrix	Collection Type	Sampling Method	Planned Date (Twice Each Year)	Area	Location	Location Type	Depth (ft)	AT 1	AT 2	AT 3	AT 4	AT 5	AT 6	AT 7	AT 8	AT 9	AT 10	AT 11	AT 12	AT 13	AT 14	AT 15	AT 16
ICD #	Reg	Water	Grab	TBD	2003	ICDF	LCRS	Leachate	NA	2	2	2	2	2	2	2	2	2	2	14	2	2	2	2	2
	Reg	Water	Grab	TBD	2004	ICDF	LCRS	Leachate	NA	2	2	2	2	2	2	2	2	2	2	14	2	2	2	2	2
	Reg	Water	Grab	TBD	2005	ICDF	LCRS	Leachate	NA	2	2	2	2	2	2	2	2	2	2	14	2	2	2	2	2
	Reg	Water	Grab	TBD	2006	ICDF	LCRS	Leachate	NA	2	2	2	2	2	2	2	2	2	2	14	2	2	2	2	2
	Reg	Water	Grab	TBD	2007	ICDF	LCRS	Leachate	NA	2	2	2	2	2	2	2	2	2	2	14	2	2	2	2	2
	Reg	Water	Grab	TBD	2008	ICDF	LCRS	Leachate	NA	2	2	2	2	2	2	2	2	2	2	14	2	2	2	2	2
	Reg	Water	Grab	TBD	2009	ICDF	LCRS	Leachate	NA	2	2	2	2	2	2	2	2	2	2	14	2	2	2	2	2
	Reg	Water	Grab	TBD	2010	ICDF	LCRS	Leachate	NA	2	2	2	2	2	2	2	2	2	2	14	2	2	2	2	2
	Reg	Water	Grab	TBD	2011	ICDF	LCRS	Leachate	NA	2	2	2	2	2	2	2	2	2	2	14	2	2	2	2	2
	Reg	Water	Grab	TBD	2012	ICDF	LCRS	Leachate	NA	2	2	2	2	2	2	2	2	2	2	14	2	2	2	2	2
	Reg	Water	Grab	TBD	2013	ICDF	LCRS	Leachate	NA	2	2	2	2	2	2	2	2	2	2	14	2	2	2	2	2
	Reg	Water	Grab	TBD	2014	ICDF	LCRS	Leachate	NA	2	2	2	2	2	2	2	2	2	2	14	2	2	2	2	2
	Reg	Water	Grab	TBD	2015	ICDF	LCRS	Leachate	NA	2	2	2	2	2	2	2	2	2	2	14	2	2	2	2	2

General Notes

1. The sampling activity (sample number) will be assigned by the INEEL SAM database. The complete number will appear on field guidance forms and sample labels.

2. The QAPjP recommends 1 duplicate sample be collected to a minimum frequency of 1/20 samples or 1/day/matrix.

3. Two samples for each analysis indicates one sample for each of the two times each year the LCRS is sampled; fourteen samples for I-129 indicates the additional monthly sampling that is performed for I-129, pH, and specific conductance

AT1: Appendix IX Metals (filtered) (plus Ca, Na, K, Mg)

AT2: Appendix IX Metals (unfiltered) (plus Ca, Na, K, Mg)

AT3: Appendix IX VOCs

AT4: Appendix IX SVOCs

AT5: Appendix IX OC Pest/PCBs

AT6: Appendix IX OC Herbicides

AT7: Appendix IX OP Pesticides

AT8: Appendix IX PCDD/PCDFs

AT9: Anions

AT10: ^{3}H (Tritium)

AT11: ^{129}I

AT12: ^{99}Tc

AT13: ^{90}Sr

AT14: ^{238}Pu, $^{239/240}Pu$

AT15: Gamma Spectroscopy

AT16: ^{234}U, ^{235}U, ^{238}U

Note: Analyses will be performed for only those constituents known to have been disposed to the landfill or pond.

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table No.
SAP No. DOE/ID-11005
Date: 6/2002 Plan Table Revision: 0 Project: ICDF Complex Monitoring
Project Manager: Dan Crisp SAM Contact:

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested															
Sampling Activity	Sample Type	Sample Matrix	Collection Type	Sampling Method	Planned Date (Annual)	Area	Location	Location Type	Depth (ft)	AT 1	AT 2	AT 3	AT 4	AT 5	AT 6	AT 7	AT 8	AT 9	AT 10	AT 11	AT 12	AT 13	AT 14	AT 15	AT 16
ICD #	Reg	Water	Grab	TBD	2016	ICDF	LCRS	Leachate	NA	2	2	2	2	2	2	2	2	2	2	14	2	2	2	2	2
	Reg	Water	Grab	TBD	2017	ICDF	LCRS	Leachate	NA	2	2	2	2	2	2	2	2	2	2	14	2	2	2	2	2

General Notes

1. The sampling activity (sample number) will be assigned by the INEEL SAM database. The complete number will appear on field guidance forms and sample labels.

2. The QAPjP recommends 1 duplicate sample be collected to a minimum frequency of 1/20 samples or 1/day/matrix.

3. Two samples for each analysis indicates one sample for each of the two times each year the LCRS is sampled; fourteen samples for I-129 indicates the additional monthly sampling that is performed for I-129, pH, and specific conductance

AT1: Appendix IX Metals (filtered) (plus Ca, Na, K, Mg)
AT2: Appendix IX Metals (unfiltered) (plus Ca, Na, K, Mg)
AT3: Appendix IX VOCs
AT4: Appendix IX SVOCs
AT5: Appendix IX OC Pest/PCBs
AT6: Appendix IX OC Herbicides
AT7: Appendix IX OP Pesticides
AT8: Appendix IX PCDD/PCDFs
AT9: Anions
AT10: ^{3}H (Tritium)
AT11: ^{129}I
AT12: ^{99}Tc
AT13: ^{90}Sr
AT14: ^{238}Pu, $^{239/240}Pu$
AT15: Gamma Spectroscopy
AT16: ^{234}U, ^{235}U, ^{238}U

Note: Analyses will be performed for only those constituents known to have been disposed to the landfill or pond.

Pump Station Sampling

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table No.
SAP No. DOE/ID-11005
Date: 6/2002 Plan Table Revision: 0 Project: ICDF Complex Monitoring
Project Manager: Dan Crisp SAM Contact:

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																
Sampling Activity	Sample Type	Sample Matrix	Collection Type	Sampling Method	Planned Date (Annual)	Area	Location	Location Type	Depth (ft)	AT 1	AT 2															
ICD #	Reg	Water	Grab	TBD	2003	Pump Station	Sump	Water	NA	1	1															
	Reg	Water	Grab	TBD	2004	Pump Station	Sump	Water	NA	1	1															
	Reg	Water	Grab	TBD	2005	Pump Station	Sump	Water	NA	1	1															
	Reg	Water	Grab	TBD	2006	Pump Station	Sump	Water	NA	1	1															
	Reg	Water	Grab	TBD	2007	Pump Station	Sump	Water	NA	1	1															
	Reg	Water	Grab	TBD	2008	Pump Station	Sump	Water	NA	1	1															
	Reg	Water	Grab	TBD	2009	Pump Station	Sump	Water	NA	1	1															
	Reg	Water	Grab	TBD	2010	Pump Station	Sump	Water	NA	1	1															
	Reg	Water	Grab	TBD	2011	Pump Station	Sump	Water	NA	1	1															
	Reg	Water	Grab	TBD	2012	Pump Station	Sump	Water	NA	1	1															

General Notes

1. The sampling activity (sample number) will be assigned by the INEEL SAM database. The complete number will appear on field guidance forms and sample labels.
2. The QAPjP recommends 1 duplicate sample be collected to a minimum frequency of 1/20 samples or 1/day/matrix.

AT1: Total Suspended Solids (TSS)

AT2: Oil and Grease

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table No.

SAP No. DOE/ID-11005

Date: 6/2002 Plan Table Revision: 0 Project: ICDF Complex Monitoring

Project Manager: Dan Crisp SAM Contact:

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested															
Sampling Activity	Sample Type	Sample Matrix	Collection Type	Sampling Method	Planned Date (Annual)	Area	Location	Location Type	Depth (ft)	AT 1	AT 2														
ICD #	Reg	Water	Grab	TBD	2013	Pump Station	Sump	Water	NA	1	1														
	Reg	Water	Grab	TBD	2014	Pump Station	Sump	Water	NA	1	1														
	Reg	Water	Grab	TBD	2015	Pump Station	Sump	Water	NA	1	1														
	Reg	Water	Grab	TBD	2016	Pump Station	Sump	Water	NA	1	1														
	Reg	Water	Grab	TBD	2017	Pump Station	Sump	Water	NA	1	1														

General Notes

1. The sampling activity (sample number) will be assigned by the INEEL SAM database. The complete number will appear on field guidance forms and sample labels.
2. The QAPjP recommends 1 duplicate sample be collected to a minimum frequency of 1/20 samples or 1/day/matrix.

AT1: Total Suspended Solids (TSS)

AT2: Oil and Grease